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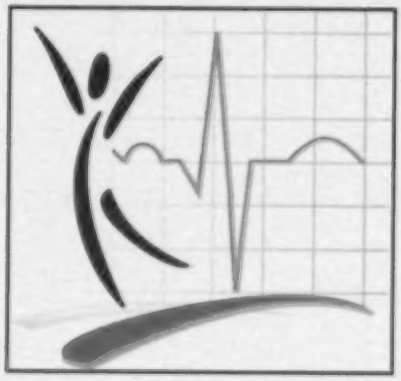

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... not applicable
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0^s value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
^{p} preliminary
^{r} revised
x suppressed to meet the confidentiality requirements of the *Statistics Act*
^{E} use with caution
F too unreliable to be published
* significantly different from reference category ($p < 0.05$)

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Health at a Glance

Deaths from Chronic Obstructive Pulmonary Disease in Canada, 1950 to 2011

by Shirley Bryan and Tanya Navaneelan

Highlights

- Chronic obstructive pulmonary disease (COPD) caused 4.4% of all deaths in Canada in 2011.
- COPD has historically caused a higher percentage of all deaths among men than among women but by 2011 the gap between the sexes had virtually disappeared.
- For men, smoking rates have been declining since 1965 and the death rate from COPD began to decline in the late 1990s.
- There has been a consistent decline in the smoking rate among women since the early 1990s but there has not yet been a decline in the COPD death rate.

Introduction

Chronic obstructive pulmonary disease (COPD) includes a group of lung diseases that block airflow into and out of the lungs making breathing difficult. **Chronic bronchitis** and **emphysema** are the two most common lung diseases that make up COPD. The symptoms, which develop slowly over time, include chronic cough and shortness of breath.[1] People with COPD typically experience a worsening of their symptoms (referred to as an acute exacerbation) one to four times per year and the frequency increases as the disease progresses. These episodes, along with activity limitation, reduce the quality of life of patients with COPD.[1] There is no cure for COPD because the damage to the lungs cannot be reversed. However, treatment and lifestyle changes can help control the symptoms and minimize further damage to the lungs.[2]

The main risk factor for COPD is smoking, which accounts for 80 to 90% of cases.[3] However, non-smokers can also develop COPD. Factors other than smoking that can cause COPD include: exposure to dusts, gasses, fumes and vapours at work; exposure to second hand smoke; exposure to air pollution such as wood smoke and traffic-related pollutants; frequent lung infections as a child; and genetic factors (e.g., alpha-1 antitrypsin deficiency).[4,5]

COPD is usually diagnosed after age 40, when a person's activities become noticeably restricted, or when problems with breathing limit one's normal role at work or home.[6] During the 2012 to 2013 time period, an estimated 1.8 million (11%) Canadians aged 35 to 79 had COPD based on their **measured airflow**.[7]

This article provides an overview of death rates from COPD between 1950 and 2011 among Canadian men and women 40 years of age and older. Data presented in this article come from the **Canadian Vital Statistics - Death Database**, 1950 to 2011, and are analysed by sex, age and **underlying cause of death**.

COPD causes 4.4% of all deaths in Canada in 2011

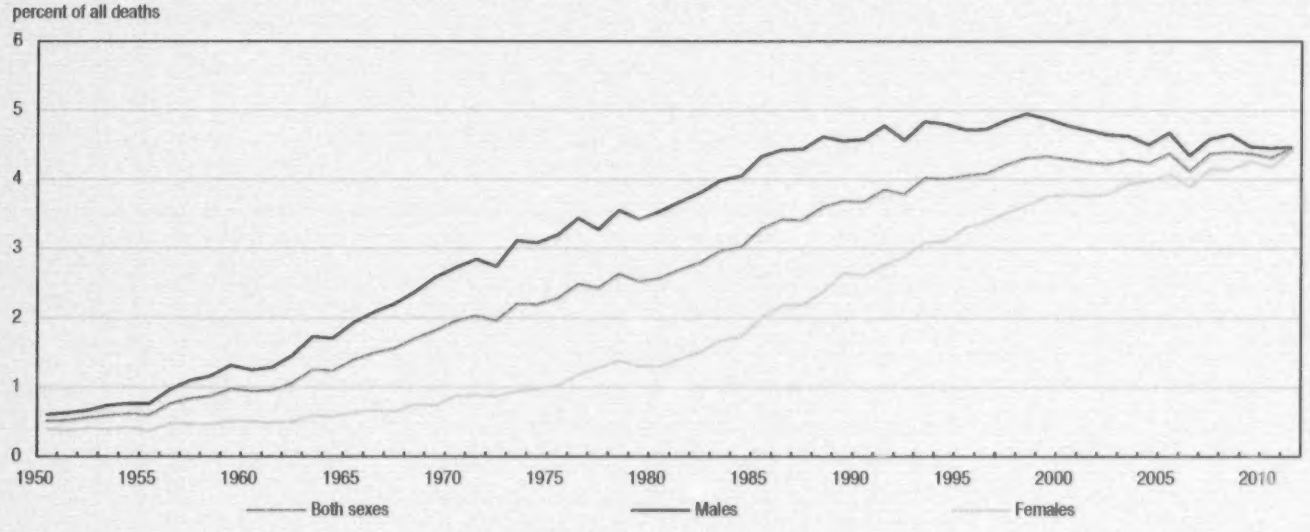
The percentage of all deaths where COPD was the underlying cause of death increased between 1950 and 1998 from 0.5% to 4.3% after which it remained relatively stable (Chart 1). For both sexes combined, in 2011, COPD caused 4.4% of all deaths in Canada among those aged 40 and older. The stability in the percentage of COPD deaths in relation to all deaths is reflective of decreasing mortality from other major causes of death such as heart disease, stroke, cancer and accidents.[8,9]

COPD has historically caused a higher percentage of all deaths among men than among women. However, by 2011 the gap in the percentage of deaths caused by COPD between the sexes had virtually disappeared (Chart 1). This is because the percentage of all deaths caused by COPD increased steadily among women between 1950 and 2011, while for men the rate remained constant throughout the 1990s and then decreased significantly between 1998 and 2011.

The difference in the death rate from COPD between men and women is highest among older Canadians

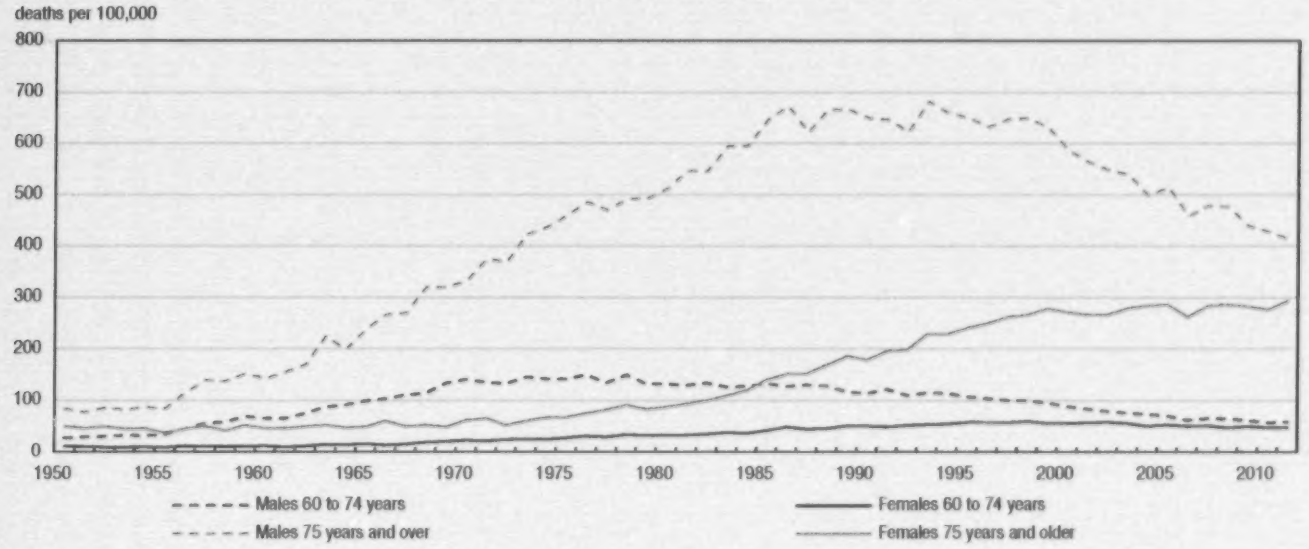
Among men aged 75 years and older, the **death rate** from COPD was highest between the mid-1980s until the late 1990s; it has been decreasing since (Chart 2). For women in this age group there was a continual increase in the death rate from COPD until the early 2000s after which it remained constant. At its peak, during the 1970s and 1980s, the difference in the death rate between men and women in this age group was relatively high (183 deaths per 100,000). In 2011, the gap still persisted but was smaller (63 deaths per 100,000).

Chart 1
Deaths from chronic obstructive pulmonary disease as a percentage of all deaths, population aged 40 and older, Canada, 1950 to 2011



Source: Statistics Canada, Canadian Vital Statistics—Death Database.

Chart 2
Death rate from chronic obstructive pulmonary disease by age group and sex, Canada 1950 to 2011



Source: Statistics Canada, Canadian Vital Statistics—Death Database

For men and women aged 60 to 74 years the death rate from COPD was relatively small in the 1950s (Chart 2). The death rate among men increased more over time than it did for women, which was the same pattern seen for those 75 years and older. Among men 60 to 74 years the death rate peaked and then reached a plateau during the 1970s after which it slowly declined. However, for women there was a slow increase in the death rate from COPD between 1950 and the early 2000s. As a result, the gap between men and women in this age group has almost disappeared (difference of 12 deaths per 100,000 between men and women in 2011).

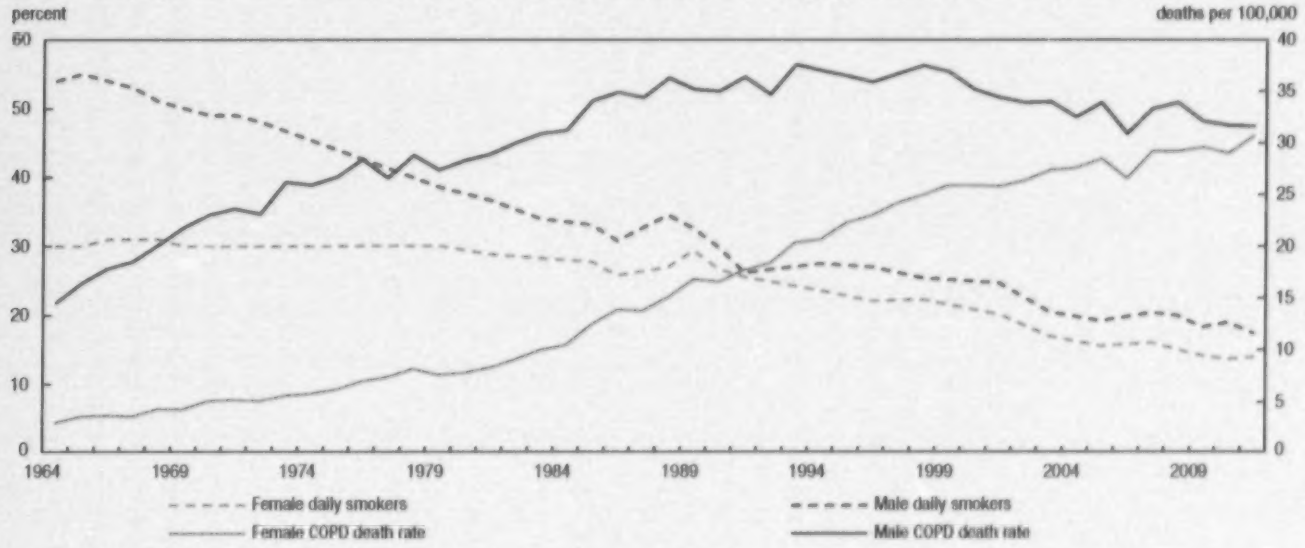
The pattern of COPD deaths in Canada by age and sex is similar to that seen in almost all countries for which data are available. That is that the death rate from COPD tends to be higher among those aged 75 and older compared to those aged 40 to 74, and higher among men than women in all age groups.[10]

The decline in the COPD death rate occurs after the decline in smoking rates

The most important risk factor for the development of COPD is smoking. People who smoke are 12 to 13 times more likely to die from COPD than people who do not smoke.[11] Previous research has identified a time lag between smoking uptake and death from COPD of about 15 to 20 years in women and 20 to 25 years in men.[12]

Smoking rates in Canada have historically been higher among men than women (Chart 3). In 1964, the gap in the smoking rate was large between men and women: 54% of men compared with 30% of women were daily smokers.[13] However, smoking rates have decreased and by 2011 the gap between the sexes had almost disappeared: 19% of men reported being daily smokers compared with 14% of women.

Chart 3
Percent of daily smokers and death rate from chronic obstructive pulmonary disease (COPD), by sex, Canada, 1964 to 2011



Source: Statistics Canada, Canadian Vital Statistics-Death Database; Organisation for Economic Co-operation Development, 2015.

Among Canadian men, smoking rates have been declining since 1965 while the death rate from COPD began to decline in the late 1990s (Chart 3). On the other hand, the smoking rates for women were relatively stable from 1964 to the early 1980s and a consistent decline in the smoking rate did not occur before the early 1990s. There has not yet been a decline in the COPD death rate among women; however, there has been no significant change since 1997.

Despite the fact that smoking rates among women were never as high as they were among men (Chart 3), the percentage of men and women with COPD based on their measured airflow in 2012–2013 was the same.[7]

One possible explanation for this pattern is that women may be more susceptible to COPD than men, particularly smoking-related COPD.[14] Decreases in lung function that occur naturally with age do not differ between the sexes for non-smokers.[14,15] However, population studies have shown that among current smokers, lung function decreases at a faster rate in women as they age compared with men, even when an adjustment is made for the quantity of cigarettes smoked. This suggests that smoking may have a greater effect on the age-related decrease in lung function for females than it does for males.[14,15]

Although the reason for these differences in susceptibility to the effects of cigarette smoke is not well understood, research has identified a few possible explanations. First, cigarette smoke may modify estrogen levels in some women and this could affect lung function.[16] For example, women who are active smokers have lower estrogen levels than non-smokers.[16] Second, bronchiol hyper-responsiveness, a condition that increases the severity of COPD symptoms and risk of dying from COPD, is more common among women than it is among men.[17,18] This condition is also more common among women who smoke compared with women who do not smoke, a finding that was not seen when male smokers were compared to male non-smokers.[17] Finally, women have smaller airways than men and this may make their airways more susceptible to the effects of cigarette smoke.[14]

Conclusion

In 2011, 4.4% of all deaths among Canadians were caused by COPD. Between 1950 and 2011, COPD caused a higher percentage of all deaths for men than for women; however, the gap between the sexes has almost disappeared. Further research is warranted to understand why women seem to be more susceptible to COPD than men despite their lower smoking rates. In addition, since people with COPD tend to have many other health conditions, an examination of COPD as both an underlying and **contributing cause of death** would be useful to understand the full extent of the burden of COPD.

Shirley Bryan and Tanya Navaneelan are analysts with the Health Statistics Division.

Data source, method and definitions

Data source

The **Canadian Vital Statistics - Death Database** includes demographic and cause of death information for all deaths from all provincial and territorial vital statistics registries in Canada. Prior to 2010, data were collected on Canadian residents who died in some American states; these deaths were excluded from this analysis. Starting with the 2010 reference year, data on Canadian residents who died in American states are no longer collected. For more information about this database please see:

http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=3233

Method

Classification of COPD deaths

The International Classification of Diseases (ICD) diagnosis codes were used to classify COPD deaths in this report according to the ICD codes outlined in the following table.[19]

Years	ICD Code
2000 to 2011	ICD-10 codes J40 to J44
1979 to 1999	ICD-9 codes 490 to 492 and 496
1969 to 1978	ICD-8a codes 490 to 492 and 519.3
1950 to 1968	ICD-7 codes 501, 502.0, 502.1, 527.1, 527.2

New revisions of the ICD are developed periodically to keep the classification system current. Revisions to the classification system may result in certain causes of death being placed in different categories (coded differently). Differences in coding could result in differences in death counts over time.[20, 21, 22, 23]

Definitions

Death rate is an estimate of the proportion of the population that died during a specific time period.

Chronic bronchitis is an inflammation of the lining of the bronchial tubes (the tubes that carry air to and from the lungs). It includes the presence of a long-term cough with mucus. Long term means most days of the week for at least three months in two successive years.[2]

Emphysema occurs when the air sacs (alveoli) at the end of the smallest air passages (bronchioles) in the lungs are enlarged or destroyed.[2]

Measured airflow is determined by spirometry. Spirometry is a test used to measure the volume of air an individual inhales and exhales, as well as, the speed at which the air is moved into and out of lungs. Respondents from the Canadian Health Measures Survey with spirometry results falling below the lower limit of normal were considered to have measured airflow obstruction consistent with COPD.[7]

Underlying cause of death is the disease or injury that initiated the events leading to death.

Contributing causes of death are diseases or injuries which played a part in the death but were not reported as the underlying cause of death.

Daily smokers are those in the population aged 15 years and over who reported smoking every day.[13]

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